

ORIGINAL RESEARCH ARTICLE

Deciphering gynaecological pathologies in women with acne and alopecia: an imaging experience

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Abstract

Polycystic ovarian syndrome manifests acne and alopecia in teenagers and young adult females. To evaluate ovarian morphology and the prevalence of polycystic ovarian morphology (PCOM) in females between the ages of 21 and 45 who are in the reproductive stage and have isolated acne and/or androgenic alopecia. And their association. The present study was done with patients in the age group of 21 to 45 years with acne and/or androgenic alopecia. Modified Ferriman-Gallwey score was used to assess the degree of hirsutism (with score of more or equal to 8 as significant). Grading of acne vulgaris and androgenic alopecia was done by a single observer. Subjects were then evaluated for biochemical investigations of Hormonal assays on day 2 to 7. Transabdominal ultrasonography was performed in the follicular phase to demonstrate the ovarian morphology. In our study isolated androgenic alopecia was present in 28 patients (24.34%). In our study 54 (46.95%) patients out of 115 had combined acne and androgenic alopecia. In our study out of 33 patients with isolated acne 17 (51.5%) had PCO Morphology with grade I, grade II, grade III having prevalence of 46.2%, 53.8% and 57.1% respectively. In our study of the 28 patients with isolated androgenic alopecia 16 (57.1%) had PCOM with grade I, II and III respectively having prevalence of 56.3%, 55.6%, 66.7% with P value of 0.939. Patients with normal ovarian morphology were 12 in number (42.9%). Of the 54 patients with combined acne and androgenic alopecia 32 (59.3%) had PCOM and 22 patients had normal ovarian morphology. Higher overall prevalence was found in patients with combined acne and alopecia (59.3%) than in isolated groups; acne (51.5%), alopecia (57.1%). In our study it was found that women with dermatological manifestations like acne and androgenic alopecia with regular menstruation. In our study it was found that these women with have high prevalence of PCOS. (*Afr J Reprod Health* 2023; 27 [5]: 30-40).

Keywords: Acne, alopecia, PCOS, mensuration, ovarian, morphology

Résumé

Le syndrome des ovaires polykystiques se manifeste par l'acné et l'alopécie chez les adolescentes et les jeunes femmes adultes. Évaluer la morphologie ovarienne et la prévalence de la morphologie ovarienne polykystique (PCOM) chez les femmes âgées de 21 à 45 ans qui sont en phase de reproduction et qui présentent une acné isolée et/ou une alopécie androgénique. Et leur association. La présente étude a été réalisée avec des patients âgés de 21 à 45 ans souffrant d'acné et/ou d'alopécie androgénique. Le score de Ferriman-Gallwey modifié a été utilisé pour évaluer le degré d'hirsutisme (avec un score supérieur ou égal à 8 comme significatif). Le classement de l'acné vulgaire et de l'alopécie androgénique a été effectué par un seul observateur. Les sujets ont ensuite été évalués pour les investigations biochimiques des dosages hormonaux du jour 2 au jour 7. Une échographie transabdominale a été réalisée dans la phase folliculaire pour démontrer la morphologie ovarienne. Dans notre étude, une alopécie androgénique isolée était présente chez 28 patients (24,34%). Dans notre étude, 54 (46,95%) patients sur 115 avaient à la fois acné et alopécie androgénique. Dans notre étude, sur 33 patients atteints d'acné isolée, 17 (51,5 %) avaient une morphologie de PCO avec une prévalence de grade I, de grade II et de grade III de 46,2 %, 53,8 % et 57,1 % respectivement. Dans notre étude sur les 28 patients atteints d'alopécie androgénique isolée, 16 (57,1 %) avaient une PCOM de grade I, II et III ayant respectivement une prévalence de 56,3 %, 55,6 %, 66,7 % avec une valeur P de 0,939. Les patientes ayant une morphologie ovarienne normale étaient au nombre de 12 (42,9 %). Sur les 54 patientes avec acné et alopécie androgénique combinées, 32 (59,3 %) avaient une PCOM et 22 patientes avaient une morphologie ovarienne normale. Une prévalence globale plus élevée a été observée chez les patients atteints d'acné et d'alopécie combinées (59,3 %) que dans les groupes isolés ; acné (51,5 %), alopécie (57,1 %). Dans notre étude, il a été constaté que les femmes présentant des manifestations dermatologiques telles que l'acné et l'alopécie androgénique avaient des menstruations régulières. Dans notre étude, il a été constaté que ces femmes ont une prévalence élevée de SOPK. (*Afr J Reprod Health* 2023; 27 [5]: 30-40).

Mots-clés: Acné, alopécie, SOPK, mensuration, ovarian, morphologie

Introduction

The underlying pathophysiology of polycystic ovarian syndrome (PCOS), a multisystem reproductive-metabolic illness with diverse manifestations, is currently poorly understood^{1,2}. It affects 5-10% of women worldwide who are of reproductive age, making it the most prevalent endocrine condition among women³⁻⁵. It is associated with highly variable prevalence estimates, ranging from 2.2% to 26%, which is due to lack of universal definition⁶⁻⁸. The main clinical signs are hyperandrogenism and irregular menstruation, which makes it difficult to conceive. Although the ovarian morphology can exist in women without the overt clinical manifestations, the ovaries of women with these symptoms are polycystic and correspond to a particular anatomical look that may be seen on ultrasound imaging.

Some PCOS symptoms may appear in teens, although a diagnosis may not come until far into adulthood. It is considered that both genetic predisposition and living style variables contribute to the aetiology of PCOS^{9,10}. The earliest precursors of PCOS have been hypothesised to include prenatal variables including abnormal foetal programming in utero and birth weight (small and/or large-for-gestational-age). A 15-20% risk of getting PCOS has been reported to be associated with premature adrenarche¹¹. A modified lifestyle that includes a high-calorie diet and inactivity leads to obesity and insulin resistance, both of which are known to be aggravating factors for PCOS¹²⁻¹³. There is evidence that stress and PCOS are related^{13,14}. There are claims that compared to British and Australian white women with PCOS, Indian patients with the condition had higher fasting insulin levels and increased insulin resistance¹⁴⁻¹⁶.

All patients who meet the 1990 NIH criteria for PCOS (classic PCOS) as well as women who have either (1) clinical/biochemical hyperandrogenism and polycystic ovaries (i.e., ovulatory PCOS) or (2) polycystic ovaries with ovulatory dysfunction are included in the more recent Rotterdam criteria for PCOS, which are currently recommended for clinical use¹⁷⁻¹⁹. Hence, the broader Rotterdam criteria have resulted in a twofold increase in the 6% to 10% prevalence of PCOS by 1990 NIH standards, with 1990 NIH-defined PCOS being the most prevalent phenotype²⁰⁻²². The main pathophysiologic elements

of PCOS appear to be androgen excess, aberrant gonadotropin dynamics, and insulin resistance despite the fact that it is a heterogeneous condition without an easily discernible, single origin.

The most typical clinical symptom of hyperandrogenism in women is hirsutism^{23,24}. Between 60% to 70% of PCOS-afflicted females have hirsutism^{25,26}. Hirsutism is characterised by excessive terminal hair growth with a distribution that resembles that of men^{27,28}. Thick coloured hair that appears suddenly and suddenly signals the presence of an androgen-secreting tumour, whereas hair development in PCOS tends to be more gradual and frequently happens after stopping the use of long-term hormonal contraceptives^{29,30}. Due to genetic variations in 5 α -reductase activity, age and ethnicity also have a substantial impact on hair growth³¹⁻³³. The most often used tool for evaluating clinical hirsutism is the modified F-G scale^{34,35}. This visual rating system assigns a grade between 0 (no terminal hairs) and 4 (frank virilization) to nine androgen-dependent body regions, yielding a score between 0 and 36. Only 5% of premenopausal White women in Hatch et al cohort's had an F-G score of 8 or above, according to their definition of hirsutism^{36,37}. Several studies have used various hirsutism cut-off criteria, occasionally changing the number of anatomical sites examined³⁸⁻⁴⁰.

Acne vulgaris

Acne is a pilosebaceous unit-specific chronic inflammatory condition. One of the most prevalent dermatological disorders affecting adolescents and young adults worldwide, including India, is acne vulgaris⁴¹⁻⁴³. Once upon a time, acne was merely seen as a cosmetically deforming dermatological disorder. Current research has demonstrated that it is more complex than a straightforward dermatological ailment and is linked to a wide range of systemic problems, with systemic endocrine abnormalities—most notably polycystic ovarian syndrome—playing a more significant role (PCOS)⁴⁴⁻⁴⁶. One of the frequently observed systemic endocrine disorders linked to acne is PCOS. Acne is present in one-third of PCOS patients, more so in younger patients⁴⁷⁻⁴⁹. By increasing sebum production, androgens contribute to the growth of acne by creating the ideal environment for bacterial species like *Propionibacterium acne* to colonise⁵⁰⁻⁵². Indian authors have classified acne vulgaris using a

straightforward grading method, which divides the condition into the following four grades. Comedones and sporadic papules in grade 1. Papules, comedones, and a few pustules in grade 2. Mostly pustules, nodules, and abscesses in grade 3. Cysts, abscesses, and extensive scarring dominate in grade 4⁵³⁻⁵⁴.

Androgenic alopecia

Men and women both have androgenic alopecia, a frequent kind of hair loss. The patterns of female androgenic alopecia might vary. Ludwig discussed the gradual weakening of the crown while maintaining the frontal hairline⁵⁵⁻⁵⁶. Moreover, it could manifest as male-pattern baldness with bitemporal recession⁵⁷⁻⁵⁸. Diffuse decline in hair volume and density can accompany either hair loss pattern caused by androgenic alopecia. Grade I: Noticeable hair thinning on the crown, confined in front by a line that extends 1-3 cm behind the frontal hair line⁵⁹. pronounced rarefaction of the crown's hair in the same region as in Grade I. Complete baldness (total denudation) in the region shown in Grades I and II is considered Grade III⁶⁰⁻⁶².

Disorders of the pilosebaceous unit, which is the term for the hair follicles and sebaceous glands collectively, include acne, androgenic alopecia, and hirsutism^{63,64}.

Role of ultrasonography

Imaging in PCOS aims to accurately detect and record the existence of polycystic ovaries. The Rotterdam criteria defines polycystic ovaries solely on total follicle number, defined as the presence of 12 or more follicles throughout the ovary measuring 2 to 9 mm in diameter and/or an increased ovarian volume >10 mL, in at least one ovary, respectively. This differs from earlier ultrasonography guidelines, supported by the ESHRE/ASRM consensus group, which defined the polycystic ovary as containing 12 or⁶⁵⁻⁶⁷.

Ovarian volume

The threshold volume for a polycystic ovary was chosen to be 10 cm³. The researchers came to the conclusion that ovarian volume should be computed using the abridged prolate ellipsoid formula (0.5 length width thickness of the ovary)⁶⁸⁻⁶⁹. Number of Follicles: According to data, those without PCOS

who have 20 or more polycystic ovaries may have: Polycystic ovaries may be discovered in women who are being examined for other gynecologic problems in the US^{70,71}. According to data, 23% of reproductive-age women will have polycystic ovaries⁷⁰⁻⁷¹. Just 5%–10% of these women, however, would have the typical PCOS symptoms of infertility, amenorrhea, hirsutism, or obesity⁷²⁻⁷³. It has been investigated how ovarian volume and antral follicle counts change with age. The general pattern of follicle count in relation to age is biphasic, showing a slower reduction of 4.8% per year before the age of 37 and a faster decline of 11.7% per year after that⁷⁴⁻⁷⁵. Yet, certain age groups exhibit a substantial variance in follicle count. In one study, antral follicle counts varied from seven to 22 during the early follicular phase of the menstrual cycle (day 2, 3, or 4) in women less than 30 years of age⁷⁶⁻⁷⁷.

Stromal Echogenicity and Volume: An increase in stromal echogenicity is one of the first traits of a polycystic ovary to be identified⁷⁸⁻⁷⁹. The ovarian stroma in PCOS and normal ovaries are both intrinsically echogenic; the subjective impression of enhanced stromal echogenicity is mostly brought on by the increase in stromal volume⁸⁰⁻⁸¹.

MRI in PCOS

Also investigated^{82,83} is the use of magnetic resonance (MR) imaging for the evaluation of polycystic ovaries. When US is inconclusive or nondiagnostic, pelvic MR imaging is advised, according to the American College of Radiology Appropriateness Guidelines^{84,85}. Due to its higher cost and the frequently sufficient vision of the ovaries during transvaginal US, the use of MR imaging is typically not indicated in the examination of polycystic ovaries^{86,87}. However, in situations where transvaginal US cannot be done and transabdominal US does not provide sufficient visibility (for example, in cases of excessive obesity), MR imaging may be useful. A polycystic ovary's typical T2-weighted MR imaging image is defined as being composed of tiny peripheral T2-hyperintense cysts and an abundance of hypointense central stroma. Although it appears that normal and polycystic ovaries may be distinguished by MR imaging⁸⁸⁻⁹⁰. Due to its limitations, MR imaging is typically not indicated in the evaluation of polycystic ovaries. Moreover, there is a paucity of research on MR imaging in PCOS, and there is no agreement on what constitutes a polycystic ovary in

terms of MR imaging. If MR imaging is used to assess polycystic ovaries, it may be feasible to report follicle counts and ovarian volume until more is known about how well it performs compared to US. increased price and the usually sufficient^{91,92}.

objectives

To evaluate ovarian morphology and the prevalence of polycystic ovarian morphology (PCOM) in females between the ages of 21 and 45 who are in the reproductive stage and have isolated acne and/or androgenic alopecia and to assess the degree to which PCOS and/or androgenic alopecia are associated.

Methods

The current investigation was carried out in the Department of Radiodiagnosis & Imaging, from July 2019 to October 2021.

Study method

Patients (females) in the age group of 21 to 45 years with acne and/or androgenic alopecia were selected. Following patients were excluded from the study: patients having irregular menstrual pattern, hirsutism with FG score >8, steroid intake, OCP intake, pregnancy, infertile patients, pre-pubertal girls, study protocol.

Following the recruitment of all subject's, informed consent was obtained, and a thorough history including menarche age, menstrual history, signs of hyperandrogenism (acne, alopecia), and a systemic examination (which included blood pressure measurement and anthropometric evaluation) were then taken. Using a modified Ferriman-Gallwey score, the degree of hirsutism was evaluated (with score of more or equal to 8 as significant). One observer graded both the androgenic alopecia and acne vulgaris. After an overnight fast of 10–12 hours, subjects were then assessed for biochemical tests (such as overall glucose tolerance test (OGTT), liver function test (LFT), kidney function test (KFT), and lipid profile). On days 2 through 7 of the menstrual cycle, luteinizing hormone (LH), Follicle stimulating hormone (FSH), thyroid function test (TFT), prolactin, and testosterone assays were performed. To display the ovarian morphology during the

follicular phase, transabdominal ultrasound was used.

Protocol for USG

Regularly menstruating women were scanned at Day 2 to 7 of menstrual cycle (follicular phase).

Ovarian size: The largest diameter in each of the three planes was measured for the ovarian volume (longitudinal, antero-posterior and transverse). The parasagittal views were used to measure the length, depth, and width, while the transverse views were used to measure the width. There are other formulas for calculating ovarian volume, but the ellipsoid formula—[Length x Width x Thickness x 0]—is the one that is most commonly used.

Follicular Number per Ovary (FNPO) and Follicular Distribution (FD):

The entire cine loop from one margin to the other was recorded and the number of cysts (< 1 cm) were counted for the entire ovary (FNPO) by scrolling the loop frame by frame. Additionally, the following were also evaluated: stromal echogenicity and endometrial thickness in mm

Results

Demographic characteristics: The mean age of participant patients was 26.1±4.27 (20-39) + SD. Majority were 20-24 years (47.1%), followed by 25-29 years (39.1%). Majority of the patients were unmarried 84 out of 115 (73%). Majority had age of menarche 12- 13 years 68 out of 115 (59.1%). Majority of the patients had normal Body Mass Index (BMI) according to WHO classification. 62 out of 115 (53.9%) had normal BMI, 45 (39.1%) were overweight and 8 (7%) were underweight. Out of 45 patients in overweight group 27 (60%) were pre-obese, 12 (26.7%), 4 (8.9%), 2 (4.4%) patients belonged to obese category I, II, III respectively. In our study, of the 115 patients 33 patients had isolated acne (28.69%). In our study isolated androgenic alopecia was present in 28 patients (24.34%). In our study 54 (46.95%) patients out of 115 had combined acne and androgenic alopecia as shown below. Out of 115 patients 65 patients had PCOM (56.5%) and 50 patients had normal ovarian morphology (43.5%). Mean ovarian volume was found to be 13.7+ 1.78 SD (Range 11- 20). Out of these 50 (76.92%) had bilateral PCOM and 15(23%)

Table 1: Association between acne and PCOS among study patients

Acne Grade	PCOM		No PCOM		P-value
	No.	%age	No.	%age	
Grade I	6	46.2	7	53.8	0.875
Grade II	7	53.8	6	46.2	
Grade III	4	57.1	3	42.9	
Total	17	51.5	16	48.5	

Table 2: Association of acne and alopecia with PCOS among study patients

Acne Grade	Alopecia Grade	PCOM		No PCOM		P-value
		No.	%age	No.	%age	
Grade I	Grade I	9	56.3	7	43.8	0.968
	Grade II	4	57.1	3	42.9	
	Grade III	-	-	-	-	
Grade II	Grade I	5	55.6	4	44.4	0.943
	Grade II	4	57.1	3	42.9	
	Grade III	2	66.7	1	33.3	
Grade III	Grade I	5	62.5	3	37.5	0.665
	Grade II	3	75.0	1	25.0	
Grade III	Grade III	-	-	-	-	0.665

Table 3: Association of PCOM with BMI among study patients

BMI	PCOM		No PCOM		P-value
	No.	%age	No.	%age	
< 25	34	48.6	36	51.4	0.032*
≥ 25	31	68.9	14	31.1	
Total	65	56.5	50	43.5	

Table 4: Association of PCOM with age among study patients

Age (Years)	PCOM		No PCOM		P-value
	No.	%age	No.	%age	
< 30 Years	57	61.3	36	38.7	0.034*
≥ 30 Years	8	36.4	14	63.6	
Total	65	56.5	50	43.5	

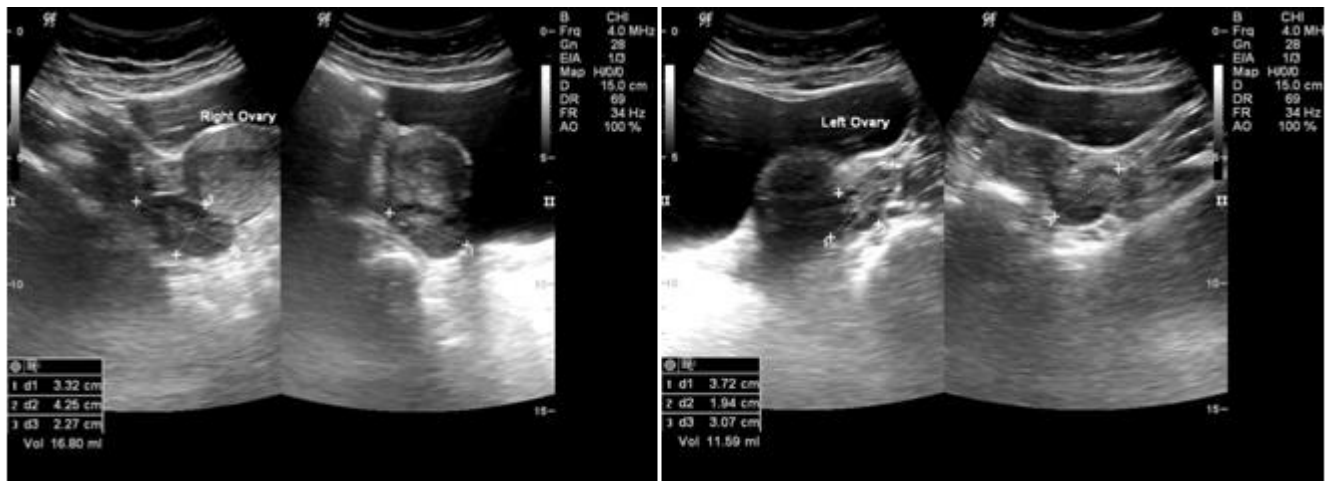
had unilateral PCOM. The mean SA ratio was found to be 0.51 ± 0.14 .

Acne: In our study out of 33 patients with isolated acne 17 (51.5%) had PCO Morphology with grade I, grade II, grade III having prevalence of 46.2%, 53.8% and 57.1% respectively. With a P value of 0.875, 16 patients exhibited normal ovarian morphology on USG, however this was not statistically significant.

Androgenic alopecia: In our study of the 28 patients with isolated androgenic alopecia 16 (57.1%) had PCOM with grade I, II and III respectively having prevalence of 56.3%, 55.6%, 66.7% with P value of 0.939. Patients with normal ovarian morphology were 12 in number (42.9%).

Combined acne and androgenic alopecia: Of the 54 patients with combined acne and androgenic alopecia 32 (59.3%) had PCOM and 22 patients had normal ovarian morphology. Higher overall prevalence was found in patients with combined acne and alopecia (59.3%) than in isolated groups; acne (51.5%), alopecia (57.1%).

Higher BMI of the women is one of the characteristics that has demonstrated a statistically significant correlation. The proportion of women with BMI greater than 25 was higher in the PCOS group (68.9%) as compared to the Non PCOS (48.6%), with a P value of 0.032. In our study age also had a strong association with PCOS. The proportion of women aged <30 years were more in PCOS group (61.3%) than in non PCOS group (36.4%).

Figure 1: Images show polycystic ovaries in patient on transabdominal sonography**Figure 2:** TAS images show polycystic ovaries in patient with grade II acne**Figure 3:** Image shows B/L PCO**Figure 4:** Image shows raised stromal morphology echogenicity with raised S/A ratio

Another factor which was statistically significant was LH: FSH ratio; A higher LH: FSH ratio was observed in PCOS group (1.42) as compared to non PCOS group (1.03) with P value of <0.001. The mean testosterone level was also found to be higher in PCOS group (51.3 ng/dl) than in non PCOS group (38.5 ng/dl), with a P value <0.001 (significant).

Statistical analysis

Microsoft Excel spreadsheets were used to enter the data, which were subsequently exported for analysis into SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Using the Student's t-test, continuous

variables were compared and represented as Mean + SD. Statistical significance was defined as a p-value < 0.05.

Discussion

In females of reproductive age, polycystic ovarian syndrome (PCOS) is a prevalent occurrence. It impacts their reproductive system as well as raising the hormone levels and causing a metabolic imbalance. Studies have been done on PCOS, and it has been identified in conjunction with a number of dermatological diseases. According to estimates, 72% to 82% of women with PCOS have cutaneous

symptoms of hyperandrogenism, including acne, hirsutism, and androgenic alopecia (AGA). Considering the increasing reports of strong association of cutaneous manifestations with PCOS, the participants in the current study were females who had androgenic alopecia or acne. The purpose of this study was to determine whether patients with androgenic alopecia and/or acne who had regular periods had a higher prevalence of polycystic ovary morphology and, consequently, polycystic ovary syndrome. (Rotterdam criteria that is clinical hyperandrogenism with PCOM on USG; thus, satisfying two of the three criteria).

Acne: Out of 33 patients with solitary acne in our study, 17 (51.5%) had PCO Morphology, with prevalence rates for grades I, II, and III being 46.2%, 53.8%, and 57.1%, respectively. According to Raja Shareef *et al.*'s study, PCOS is 30% more common in women with acne than it is in women without acne, with grade I, grade II, and grade III acne having PCOS prevalences of 58%, 29%, and 13%, respectively. 16 patients had normal ovarian morphology on USG with a P value of 0.875, which was not statistically significant. However, their study included included women whose periods were irregular. Similar findings were also observed by Maluki AH *et al.* in their study, where they found that 6.2% of the healthy control group and 51.2% of the women with resistant acne had PCOS, respectively.

The evidence is fairly inconsistent when it comes to the prevalence of PCOS in women who have acne. In their study, Betti R *et al.* estimated the prevalence of PCOS using ultra-sonography and found that 52.17 percent of women had the condition. In their comparison study of women with acne and a healthy control group, Kelekci KH *et al.* found that the prevalence of PCOS was 26.9% in the acne-prone women and 8.4% in the age-matched controls.

Similar results have also been reported by Maluki AH *et al.* who found that 6.2% of the healthy control group had PCOS, while 51.2% of women with resistant acne reported having the condition. 11 PCOS was identified by Abdullah Z *et al.* among 28.8% of acne cases and 9.3% of controls. 12 According to NIH standards, there was a prevalence of 60.2% and 48.3%, respectively, according to Zandi S *et al.* 37% of the patients experienced monthly irregularities, and 54% of the patients reported having hirsutism. There was no statistically

significant correlation between PCOS and the women's age, marital status, or menstrual cycle regularity. Greater BMI in females, the prevalence of hirsutism, and a larger waist circumference were the factors that demonstrated a statistically significant connection. In the PCOS group, there were more women with a BMI over 30 than in the Non PCOS group (53.33% vs 22.85%, p value 0.011), which was statistically significant. Another statistically significant difference between the two groups was that more PCOS women (60% vs. 25.7%, p value 0.001) had waist circumferences greater than 88 cm than non-PCOS women. When compared to women in the non-PCOS group, a higher percentage of women in the PCOS group (93.33% vs. 72.8%, p value 0.02) had hirsutism.

Androgenic alopecia: In our study of the 28 patients with isolated androgenic alopecia 16 (57.1%) had PCOM with grade I, II and III respectively having prevalence of 56.3%, 55.6%, 66.7% with P value of 0.939. Patients with normal ovarian morphology were 12 in number (42.9%). The prevalence of PCO was reported to be 67% in women with androgenic alopecia in Ester Cela *et al.* study in 2003, compared to 27% in the control group.

Combined acne and androgenic alopecia: Of the 54 patients with combined acne and androgenic alopecia 32 (59.3%) had PCOM and 22 patients had normal ovarian morphology. Higher overall prevalence was found in patients with combined acne and alopecia (59.3%) than in isolated groups; acne (51.5%), alopecia (57.1%).

Higher BMI of the women is one of the characteristics that has demonstrated a statistically significant correlation. The proportion of women with BMI greater than 25 was higher in the PCOS group (68.9%) as compared to the Non PCOS (48.6%), with a P value of 0.032.

In our study age also had a strong association with PCOS. The proportion of women aged <30 years were more in PCOS group (61.3%) than in non PCOS group (36.4%). Another factor which was statistically significant was LH: FSH ratio; A higher LH: FSH ratio was observed in PCOS group (1.42) as compared to non PCOS group (1.03) with P value of <0.001. The mean testosterone level was also found to be higher in PCOS group (51.3 ng/dl) than in non PCOS group (38.5 ng/dl), with a P value <0.001 (significant). The

presence of androgen-dependent symptoms even when androgen levels were within the normal range is an interesting observation. This is probably because target tissues produce more androgens and remove them out of the body more often, but this was not precisely explored in this study.

Patients' marital status or menarche age have not been associated with PCOS in a statistically meaningful way. These results corroborated a few earlier research that had been written about the topic. About 54% of the women with PCOS in the study by Zandi S *et al.* complained of hirsutism, and 37% of them experienced monthly irregularities. In women with PCOS, Falsetti, L. *et al.* have found a high correlation between hirsutism, acne, and numerous hormonal dysfunctions. In particular, hirsutism, acne vulgaris, and androgenetic alopecia are strongly associated with several cutaneous markers of hyperandrogenism, according to research by Lee, A. T. *et al.*

Hence, in women with acne, the presence of obesity, a larger waist circumference, and other cutaneous signs of hyperandrogenism should strongly suggest the presence of underlying PCOS. These women must undergo the proper diagnostic testing in order to identify PCOS early on and receive adequate treatment to stop the long-term physical and psychological effects of this systemic endocrine malfunction.

Conclusion

This study's primary goal was to determine the prevalence of PCOS in women who had regular menstrual cycles and dermatological symptoms including acne and androgenic alopecia. According to our research, these patients have a significant frequency of PCOS. Women who exhibit these dermatological symptoms should therefore be checked for Polycystic Ovary Syndrome. These patients had greater average testosterone levels and LH:FSH ratios than other women. Women with greater body mass indexes were shown to have a higher prevalence of PCOS.

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